Recent advances in the perioperative management of pre-eclampsia

An Essay

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List of Abbreviations

Abb.	Full term
ACR	Albumin Creatinine Ratio
AFLP	Acute Fatty Liver of Pregnancy
AOR	Adjusted Odds Ratio
ARDS	Acute Respiratory Distress Syndrome
ASA	American society of Anesthesiologist
BMI	Basal Metabolic Rate
BP	Blood Presure
C.S	Cesareans Section
CNS	Central Nervous System
CO	Cardiac Output
CSE	Combined Spinal Epidural
CST	Corticosteroids
CVC	Central venous catheter
CVP	Central venous Pressure
CVS	Cardiovascular System
DBP	Diastolic Blood Pressure
DIC	Disseminated Intravenous Coagulopathy
DM	Diabetes Mellitus
FFP	Fresh Frozen Plasma
FGR	Fetal Growth Retardation
GA	General Anesthesia

HCG……..Human Chorionic Gonadotropin
HCS……Human Chorionic Somatomammotropin
HLA……Human Leukocyte Antigen
HTN……....Hypertension
HUS……Hemolytic Uremic Syndrome
IHD……Ischemic Heart Disease
IUGR……..…Intra Uterine Growth Retardation
IV……Intravenous
LFT……liver Function Tests
LMWH……..Low Molecular Weight Heparin
MHC……..…..Major Histocompatibility
NICU……..…..Neonatal Intensive Care Unit
NK……..……Natural Killer
NPV……Negative Predictive Value
NSAIDs……..Non-Steroidal Anti-inflammatory
P1GF……..…Placental Growth Factor
PAP……...…Pulmonary Artery Pressure
PCWP……Pulmonary Capillary Wedge pressure
PET……..……Preeclampsia
SBP……Systolic blood Pressure
sEng……Soluble Endoglublin
SGA……..Small for Gestational Age
SLE……Systemic Lupus Erythematosus
SVR……Systemic Venous Return
TTP……..…Thrombocytopenic Purpura
UO……Urinary Output

US……Ultrasound
MRI…… Magnetic Resonance Imaging
UTI……Urinary Tract Infection
VEGF……..Vascular Endothelial Growth Factor
VTE……..….Venous Thromboembolism

INTRODUCTION

Preeclampsia is a disorder of widespread vascular endothelial malfunction and vasospasm that occurs after 20 weeks' gestation and can present as late as 4-6 weeks postpartum. It is clinically defined by hypertension and proteinuria, with or without pathologic edema **(Vatten and Skjaerven, 2004).**

Recent investigations are being of greater help nowadays. Congo red spotting test (urine CR) may be better than currently used current dipstick methods at diagnosing preeclampsia and indicating the need for medically indicated delivery, other investigations as measuring urinary albumin by using high-performance liquid chromatography in early and uncomplicated pregnancy, spot urinary albumin: creatinine ratio (ACR) values are higher. If measured early in the second trimester, an ACR of 35.5 mg/mmol or higher may predict preeclampsia before symptoms arise **(Buhimschi *et al.*, 2014).**

Complications of preeclampsia are serious and may affect both the mother and the fetus; acutely preeclampsia can be complicated by different types of stroke either ischemic or hemorrhagic which may lead to intercerebral hemorrhage. Other serious complication is HELLP syndrome. Recently, this syndrome undergoes new classification made by university of Mississippi, which classified the disease into 3 classes according to degree of

thrombocytopenia, evidence of suggestive hemolysis and evidence of hepatic dysfunction, another classification made by university of Tennessee, which had the same criteria **(Martin *et al.*, 2006).**

Adequate new evidence of reducing the risk of preeclampsia, preterm birth, and IUGR in women at increased risk for preeclampsia, who received low-dose aspirin, has demonstrated substantial benefit. Low-dose aspirin (range, 60 to 150 mg/d) reduced the risk for preeclampsia by 24% in clinical trials and reduced the risk for preterm birth by 14% and IUGR by 20% **(Michael, 2014).**

The usage of antihypertensive drugs in mild pregnancy-induced hypertension or pre-eclampsia is not strongly recommended, only when blood pressure is greater than 150/100 mmHg, labetalol, methyldopa or nifedipine are advised as the drugs of choice. Despite that the conventional treatment of pregnancy induced hypertension is Methyldopa (Aldomet), new studies revealed that Beta blockers and calcium channel blockers seem to be more effective than Methyldopa as they reduce the overall risk of developing proteinuria/pre-eclampsia when either are compared with Methyldopa **(Abalos *et al*., 2014).**

Aim of the Work

Discussing recent anesthetic management for pre-eclampsia and other hypertensive disorders, and to emphasize on the importance of the peri-operative management to prevent further complications so we can improve prognosis.

PATHOPHYSIOLOGY OF PRE-ECLAMPSIA

Definitions:

Preeclampsia is a disorder of widespread vascular endothelial malfunction and vasospasm that occurs after 20 weeks' gestation and can present as late as 4-6 weeks postpartum. It is defined as increased blood pressure and proteinuria, with pathologic edema or without it **(Sibai, 2003)**.

A definite medical consensus is lacking regarding defining preeclampsia and determining its values, but there're reasonable criteria for women who have normal blood pressure before 20 weeks' gestation, this criteria is associated with measuring the patient's blood pressure, 2 successive consecutive measurements with 4-6 hours interval are needed and the results are 140/90 or more. Preeclampsia in a patient with preexisting essential hypertension is diagnosed if systolic blood pressure has increased by 30 mm Hg or if diastolic blood pressure has increased by 15 mm Hg **(Vatten and Skjaerven, 2004).**

Eclampsia is defined as seizures without any attributable other cause in a patient with preeclampsia **(Ngoc *et al*., 2006).**

The international incidence of the disease is 5-14%, while this incidence increases in the developing countries as it reaches 4-18% **(Sibai, 2004).**

Hypertensive disorders of pregnancy are considered one of the commonest causes (the second) of stillbirth and early neonatal deaths **(Ness and Roberts, 1996).**

Despite hypertension is a firm characteristic of preeclampsia, other symptoms or laboratory findings may appear first, as edema, headache, visual disturbances, and epigastric tenderness **(Tuffnell *et al*., 2006).**

Classification:

The proper classification of any disease is supposed to be a reflection of multiple factors as; pathophysiology, risks and outcome. Numerous prestigious bodies have accepted our following classification of hypertensive disorders whether proteinuria is required or not to diagnose preeclampsia **(Magee *et al*., 2014).**

Internationally, in the latest guidelines, proteinuria is not required anymore to diagnose pre-eclampsia, leaving only the British NICE guideline with this requirement **(Tranquilli *et al*., 2013)**.

The classification is as follows:

1- Pre-eclampsia – Eclampsia.

2- Gestational hypertension.

3- Chronic hypertension: a- Essential. b- Secondary.

c- White coat: it means only elevation of the BP while measured by a clinician; otherwise it is normal if measured by home BP monitoring for example **(Bulletin, 2002).**

- **Pre-eclampsia:**

It is a multisystem disorder related only to human pregnancy characterized by hypertension (HTN) and involvement of one or more other organ systems and/or the baby. Despite proteinuria is the commonest additional feature next to HTN and easily recognised, it shouldn't be considered as a clinical obligation for the diagnosis. Pre-existing HTN is a strong risk factor for developing PET **(Nelson, 2003).**

Preeclampsia is classified into mild and severe, mild preeclampsia is defined as increased blood pressure (BP ≥140/90 mm Hg) on 2 successive consecutive measurements, at least 6 hours apart, with excluding end-organ damage, in a patient who had normal BP before 20 weeks' gestation. In a patient with preexisting essential HTN, preeclampsia is diagnosed if systolic blood pressure (SBP) has increased by 30

mm Hg or if diastolic blood pressure (DBP) has increased by 15 mm Hg **(Villar *et al*., 2001).**

While severe preeclampsia doesn't have simple definition, it has a criterion to be fulfilled. This criterion is present preeclampsia with 1 of the following symptoms or signs:

- Measurements of 160 mm Hg or greater for her systolic or 110 mm Hg for her diastolic blood pressure on 2 successive consecutive measurements, at least 6 hours apart.
- Reduced oxygen saturation that leads to cyanosis or pulmonary edema.
- Low urine output (24 hour collection of less than 400 mL).
- Investigations that reveal either impaired liver functions or proteinuria of more than 500 mg in a 24 hour collection. If the urine sample is random, at least 2 samples with 4 hours interval is needed with proteinuria of 3+ or higher
- Persistent headache.
- Oligohydramnios decreased fetal growth, or placental abruption.
- Upper right quadrant or epigastric pain.
- Decreased platelet count.

Severe preeclampsia may complicate into disseminated intravascular coagulopathy (DIC), renal and liver failure or even central nervous system (CNS)

disorders or even HELLP syndrome **(Khedun *et al*., 1997).**

Preeclampsia is mild in 75% of cases and severe in 25% of them. If seizures develop on top, the disorder has developed into eclampsia **(Sibai, 2004).**

Superimposed pre-eclampsia:

If a chronic hypertension patient develops further manifestation of preeclampsia after 20 weeks of gestation, in this case it's diagnosed as superimposed preeclampsia. If proteinuria preceded other manifestations it's harder to diagnose the disease as proteinuria normally increases during pregnancy. In these patients closer monitoring is required, but the diagnosis is not confirmed without appearance of other maternal systemic manifestations or fetal effects with or without Small for Gestational Age (SGA), as oligohydramnios or abnormal flow in uterine artery Doppler **(Chappell *et al*., 2008).**

Preeclampsia as previously defined could be diagnosed when hypertension appears after 20 weeks of gestation, with the involvement of one or more of the following: **(Ritchie and Brown, 2010).**